

Tularosa Basin National Desalination Research Facility Study

Background

Access to fresh water is an increasingly critical national and international issue. Demand for fresh water in many regions of the world has already outstripped supply. Saline and brackish waters constitute over 97% of the water in the world. Supplementing fresh water supplies through cost-effective “revolutionary” brine and saline waters desalination technologies would provide significant relief to the limited fresh water resources in many parts of the world.

To address the development of the “next generation” of desalination technologies needed to realistically impact future fresh water supplies, a federal *partnership* between Sandia National Laboratories and the Bureau of Reclamation was established to evaluate the development of a new desalination research facility in the Tularosa Basin of New Mexico to test and evaluate novel technologies for brackish ground water desalination and concentrate reuse and disposal. The partnership leverages the unique energy efficiency and renewable energy expertise as well as salt and brine engineering and research capabilities at Sandia with the well-established desalination research and testing capabilities and expertise of the Bureau of Reclamation. The technical expertise of these two organizations in salt and brine chemistry, geology, engineering, desalination testing and evaluation, renewable energy, environmental technology, and materials science provide valuable expertise to this effort.

Advantages of the Tularosa Basin

The ground water resources of the Tularosa Basin have been extensively studied. The basin has extensive brackish ground water resources and has over 100 million acre-feet of recoverable brackish ground water. Within a 5-mile radius, water with salinity from 1000 ppm total dissolved solids (TDS), almost fresh water, to over 60,000 ppm TDS, almost twice as salty as sea water, is available. A wide range of water chemistries including sodium chloride, carbonate, and sulfate based brine waters also exist in the basin. The water resources of the basin provide an opportunity to evaluate new desalination technologies over a wide range of water chemistry and quality in one location. Additionally, the Tularosa Basin is one of the world’s leading areas of wind, solar, and geothermal energy enabling the assessment of renewable energies to help reduce future desalination costs.

Facility Study Results

An Executive Committee of water resource and desalination experts from around the country and large municipal water agencies from the southwest was formed to help guide in the evaluation of potential facility sites and identify the research attributes of the proposed facility. The facility design and location were developed to effectively conduct activities to support national and international research on inland brackish ground water desalination, concentrate management and reuse, and renewable energy research related to inland desalination. Based on several evaluation criteria, a site in the southwest part of Alamogordo, New Mexico near the intersections of US Highway 70 to Las Cruces and US Highway 54 to El Paso was selected as the preferred location for the research facility.



Facility Location Features

- Within Alamogordo city limits and near existing utilities,
- Site location for easy access to saline and brackish waters of 2000, 7000, and 15000 ppm TDS,
- Right of ways available for well field pipeline,
- 30-acre site to allow for future expansion and concentrate and renewable energy applications, and
- Good access and visibility from major highways.

Facility Design Features

- About 13,000 square feet of passive-solar building for desalination research, that includes:
 - 6- research bays for pilot –scale desalination testing at up to 30 gpm each
 - Office space for operations staff and visiting researchers
 - Control and Conference rooms
 - Areas for bench-scale system testing
 - Water laboratory, and areas for equipment maintenance and chemical storage
 - A resource and learning area for visitors
- Outdoor research pads for larger-scale desalination testing,
- 4-5 acres for evaluation of renewable energy desalination applications,
- 4-5 acres for concentrate disposal and minimization,
- 4-5 acres of concentrate reuse for agricultural applications, and
- Site layout for self-guided visitor tours of all research areas.

Facility Development and Operational Schedule

Preliminary engineering cost estimates suggest that the design and construction of the research building, well field, exterior testing and concentrate research areas, and furnishing of the facility will cost approximately \$4.5-5 million for the preferred site. Environmental compliance, well drilling, and cultural resource permitting, water rights permitting, as well as design-build proposal package development activities have been initiated to help accelerate final site selection and facility design and construction.

Congress authorized initial funding for the facility final design and construction in FY03. Funding to complete the facility is expected in FY04. Initial facility startup is expected within fifteen to eighteen months of start of construction. The facility could be expected to be at full operational capability within a year of initial facility start up.

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